Hydrogeological structure of hydraulic conductive fractures in gallery scale and their rock matrix

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In geological disposal of high-level nuclear waste, hydraulic conductive fractures in crystalline rock such as granite have been considered as a main pathway for radionuclides. Diffusion and absorption of radionuclide through microstructure in rock matrix can make mass transport to retard. Because the change of the characteristics of microstructure in rock matrix by structural movement and hydrothermal alteration have an effect on mass transport, it is important to understand the distribution and the structures of hydrogeological continuity of fractures as well as their characteristics of microstructure in rock matrix.
The characteristics of hydraulic conductive fractures and their microstructure in rock matrix across multiple boreholes to the west side of the gallery at 300 m depth of Mizunami Underground Laboratory are summarized as follows, hydraulic conductive fractures, which mainly show NW strike and high dip angle, have two types of characteristics: calcite-filled fractures with highly matrix chloritization and fractures with poor filling minerals which is formed along cataclastic texture. The transmissibility coefficients in both types of fractures are measured about 10^{-7}-$10^{-5}m^2/s$. They make hydraulic conductive zone connected by low dip angle fractures, which is distributed around the Upper fracture zone in Toki Granite. On the other hand, hydraulic conductive fractures on the east side of the gallery at 300 m depth, according to the investigation of 2 boreholes about 40 m each, tend to have smaller inflow, higher alteration in rock matrix and filling minerals in fractures compared to the west side. According to the result of borehole TV observation of the borehole which has larger inflow, the direction of fractures shows NW and NE strike with high dip angle and also low dip angle fractures the same as the west side of the gallery. As a result of scanning with the X-ray CT, a higher density mineral than the surroundings is filling the fractures with partly opened part. The distribution of fracture-filling minerals can be caused a low permeability at the east side of the gallery compared to the west.
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